

## CLAIMS

1. Method for pre-heating, transforming and melting a metal charge comprising metal scrap, in an electric arc furnace (12) associated with a tunnel (11) that transports, pre-  
5 heats and discharges said scrap, the furnace (12) comprising a hearth (13) and a roof (14) through which the electrodes (15) pass, characterized in that it provides:
- that the furnace (12) is weighed at least periodically in order to detect the quantity of discharged scrap present  
10 inside the furnace (12) itself;
  - that the temperature of the liquid bath inside the furnace (12) is detected at least periodically, and
  - that at least the discharge delivery of the scrap inside the furnace (12) is detected by weighing and is regulated  
15 in order to maintain said temperature of the liquid bath around a pre-determined value.
2. Method as in claim 1, characterized in that the electric power delivered to the furnace (12) is varied continuously from a minimum value in correspondence with the first  
20 unloading step of the scrap to a maximum value in correspondence with the melting step according to the quantity of scrap present inside the furnace (12) as detected by weighing the furnace (12).
3. Method as in claim 1 or 2, characterized in that the  
25 loading of the furnace (12) with the scrap is interrupted before tapping of the liquid metal for an interval of between about 8 and 12% of the overall time of the cycle.
4. Method as in any claim hereinbefore, characterized in that the feed of the electric power to the furnace (12) is  
30 interrupted before tapping for a time of up to 5% of the overall time of the cycle.
5. Method as in claim 2, characterized in that said minimum value of electric power delivered is made to increase from

an initial value of about 40-50% of the working value, to its maximum value.

6. Method as in any claim hereinbefore, characterized in that a quantity of liquid metal of around 30-40% of the overall capacity is always left in the furnace (12) so as to constitute a liquid reserve for the subsequent cycle.

7. Method as in any claim hereinbefore, characterized in that in the tapping step the electrodes (15) are at least raised from the liquid bath and the electric feed to them is interrupted.

8. Method as in any claim hereinbefore, characterized in that between the end of the tapping operation and the start of loading the scrap for the subsequent cycle, the electric feed to the electrodes (15) is interrupted and the following operations are carried out:

- a) the furnace (12) is rotated from the tapping position to the slagging position in order to interrupt the flow of liquid steel;
- b) the cleaning of the tapping hole is controlled;
- 20 c) the tapping channel is filled with granular material with a high melting point;
- d) the furnace is returned to the horizontal position and abutments are inserted that limit the rotation to the reduced values during normal functioning;
- 25 e) the electrodes are enabled to descend and the delivery of electric power is restored.

9. Plant for pre-heating, transforming and melting a metal charge consisting of metal scrap, comprising a tunnel (11) that transports and pre-heats the scrap and an electric arc furnace (12), said electric furnace (12) comprising a hearth (13) to contain the scrap and a covering roof (14) through which electrodes (15) pass, supported and moved by relative arms (16), characterized in that it comprises

weighing means (18) to weigh said electric furnace (12), means to detect the temperature of the bath of liquid metal inside said furnace (12), and means able to regulate the speed of unloading the scrap inside said furnace (12) according to the detections made by said weighing means in order to keep the temperature of said bath of liquid metal around a pre-determined value.

10. Plant as in claim 9, characterized in that said weighing means comprise load cells (18).

11. Plant as in claim 9, characterized in that said hearth (13) is mounted on jacks (17) able to make it oscillate for a limited angle, comprised between  $\pm 4^\circ$ , during normal functioning, for example during the steps of loading, melting and refining the liquid metal, and for a greater angle, comprised between  $-15^\circ$  and  $+25^\circ$ , during the steps of discharging the slag and tapping the liquid metal.

12. Plant as in claim 9, characterized in that said hearth (13) has a shape, in relation to the inclination that it assumes in the step of tapping the liquid metal, such as to keep a liquid pool equal to about 30-40% of its capacity.

13. Plant as in claim 9, characterized in that said transport and pre-heating tunnel (11) comprises a plurality of injection systems, wherein at least the one nearest the electric furnace (12) has at least a burner (19) and wherein at least in a position adjacent to said burner (19) there is at least an air injector (20).

14. Plant as in claims 9 and 13, characterized in that in the initial part of said tunnel (11), in a position adjacent to a pre-heated fume-outlet pipe (24), there is a compensation chamber (23) able to function as a sealing system in order to prevent exhaust fumes emerging from the tunnel (11) from leaking into the atmosphere.

15. Plant as in any claim from 9 to 14 inclusive,

characterized in that in cooperation with said transport and pre-heating tunnel (11) there is a sedimentation chamber in order to deposit the particulate with which a cooling tower (27) is associated in order to take the  
5 temperature of the fumes, entering at about 20 m/s, to about 250°C or less.